

5-10 year priorities for nuclear data covariances and uncertainty quantification as defined by the Nuclear **Data Uncertainty Quantification Meeting**

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Nuclear Data Uncertainty Quantification Working Meeting (NDUQM) defined 5-10 year priorities for ND cov. & UQ.

- Took place Oct. 11-13, 2022.
- Asked for by DOE Office of Science to advise on needs for future work.
- Goal:
 - To draft a whitepaper on prioritized nuclear data covariance and uncertainty quantification needs impacting users,
 - Needs must be actionable (i.e., high-level plan must be given to address them),
 - Needs must be feasible to tackle (high-level idea of funding must be provide).
- Advisory committee: 30 participants spanning
 - Producers: experiment, modeling, evaluation, processing, validations.
 - to users: astrophysics, criticality safety, isotope production, neutron dosimetry, nuclear medicine, nuclear security, NRC, reactor design, safeguards, space applications, etc.
 - On first day, 10 DOE program managers observed.



Cross-cutting and prioritized high-level priorities

- 1. Towards complete, medium-fidelity covariances:
 - 1. Neutron-induced cross-sections up to 60 MeV,
 - 2. Angular distributions,
 - 3. Charged-particle induced reactions up to 250 MeV.
- 2. Quality assurance of covariances via standardized V&V and proper documentation,
- 3. Towards a more complete and easier accessible EXFOR and expert judgment database
 - 1. Create easily accessible EXFOR app and store data as used by evaluators,
 - Maintain and update templates,
 - 3. Develop tools to assess unrecognized systematic uncertainties,
- 4. Expand training on covariances, existing UQ methods and tools,
- 5. Open-source adjustment tools for general user community.



Other priorities

- Open-source tools to compute sensitivities for various integral responses,
 - Code comparison and review of existing tools,
 - RR, spectra, sub-crits,
 - Fixed source, reactivity coefficients,
 - Make recommendations how other user communities can use tools,
- New evaluations of covariances:
 - TSL,
 - FPY,
 - Decay constants,
 - Branching ratios,
 - Stopping power,
 - Delayed neutrons,
- Sampling tools for applications that are in non-linear regime,
- Identify historic integral experiments for re-evaluations.

